



2019

The impact of response rate on Hospital Consumer Assessment of Healthcare Providers and System (HCAHPS) dimension scores

Erin Godden

Professional Research Consultants, egodden@prccustomresearch.com

Andrea Paseka

Professional Research Consultants, apaseka@prccustomresearch.com

Jan Gnida

Professional Research Consultants, jgnida@prccustomresearch.com

Joe Inguanzo

Professional Research Consultants, jinguanzo@prccustomresearch.com

Follow this and additional works at: <https://pxjournal.org/journal>



Part of the [Health and Medical Administration Commons](#), and the [Health Services Research Commons](#)

Recommended Citation

Godden, Erin; Paseka, Andrea; Gnida, Jan; and Inguanzo, Joe (2019) "The impact of response rate on Hospital Consumer Assessment of Healthcare Providers and System (HCAHPS) dimension scores," *Patient Experience Journal*: Vol. 6 : Iss. 1 , Article 13.

Available at: <https://pxjournal.org/journal/vol6/iss1/13>

This Research is brought to you for free and open access by Patient Experience Journal. It has been accepted for inclusion in Patient Experience Journal by an authorized editor of Patient Experience Journal.

The impact of response rate on Hospital Consumer Assessment of Healthcare Providers and System (HCAHPS) dimension scores

Erin Godden, PRC, egodden@prccustomresearch.com

Andrea Paseka, PRC, apaseka@prccustomresearch.com

Jan Gnida, PRC, jgnida@prccustomresearch.com

Joe Inguanzo, PRC, joe@prccustomresearch.com

Abstract

Patient experience measurement is receiving considerable attention from hospital executives, healthcare leaders, purchasers such as the Centers for Medicare and Medicaid Services (CMS), and patients. It is therefore appropriate and necessary to examine the methods of survey administration, and the analysis presented here seeks to understand the impact of one particular aspect of the measurement: response rate. Utilizing publicly reported HCAHPS (Hospital Consumer Assessment of Healthcare Providers and Systems) data from Hospital Compare, a positive correlation between response rate and HCAHPS scores nationwide was identified and replicated. This correlation, which was most recently published by the Hospital Quality Institute (HQI) for California facilities, implies that increasing response rates can return higher HCAHPS dimension scores. Accurate patient perceptions of the inpatient experience may be hidden by insufficient representativeness of the data. In other words, publicly-reported scores may be lower than they should be, and hospitals may be mistakenly devaluing their efforts to improve the patient experience. Responses from a more representative sample of the patient population are key to capturing more accurate HCAHPS scores.

Keywords

HCAHPS, response rate, dimension scores, overall rating, patient experience, measurement, quality of care, quantitative methods

Introduction

Patient experience has been elevated in the priorities of healthcare leaders in recent years as organizations have come to understand the rationale for and benefits of improving patient experience.¹⁻² Not only has a patient experience focus been shown to yield better financial outcomes in terms of both CMS reimbursements and increased patient loyalty and market share,³ it is also increasingly regarded as a crucial quality measure.⁴⁻⁵

Healthcare organizations are making greater investments toward improving patient experience than ever before in time, training, the appointment of executive positions, and most importantly, the day-to-day interactions that are occurring between caregivers and patients. At all levels of the organization, efforts are being made, and patient survey scores are being monitored. Healthcare organizations need to understand the return they are getting from their investments in patient experience, and they need to feel confident that the measurement accurately reflects the perceptions of their entire patient population; therefore, the methods and standards for evaluating patient experience performance are worthy of regular examination.

Understandably, a completely objective measure of how human beings perceive the care they received is impossible to create, which sets patient experience apart from the many other quality metrics used to evaluate the overall performance of a hospital. The HCAHPS Survey was developed as the first national standard for collecting patient perceptions of inpatient care, and it remains an important tool for assessing patient experience.⁶ As hospitals use it to both measure overall patient experience and maximize returns in the Hospital Value-Based Purchasing (VBP) program, they continue to place a strong focus on their HCAHPS scores. Additionally, these scores and other measures of the patient experience have become increasingly valuable and visible to the public.⁷ Just as consumers look to online reviews before making major purchases, increasing numbers of patients now review websites for ratings when selecting a healthcare provider. It is imperative that hospitals accurately capture their patient experience performance to maintain favorable scores and remain relevant in the quickly-changing healthcare marketplace.

Of late, survey response rates are receiving more and more attention from CMS. During the 2017 HCAHPS Vendor Update Training, CMS articulated a concern about low

response rates for the first time.⁸ In October 2017, the Agency for Healthcare Research and Quality (AHRQ) issued a literature review addressing topics of increasing concern to CAHPS survey users.⁹ This was followed by a CMS podcast posted in April 2018 offering suggestions about how to improve response rates because “they affect HCAHPS measure reliability at the hospital level.”¹⁰ AHRQ continued their exploration of this phenomenon with a research meeting in September 2018, where the stated focus was on “improving response rates for CAHPS surveys and ensuring the representativeness of respondents to CAHPS surveys.”¹¹ It is therefore appropriate and necessary to examine the methods of survey administration, and the analysis presented here seeks to understand the impact of one particular aspect of the measurement: response rate. Recent analysis¹² revealed a moderate correlation between response rate and scores, suggesting that increasing response rate can result in higher HCAHPS dimension scores as a more representative sample is obtained.

Methodology

Rolling 12-month periods of HCAHPS data are refreshed quarterly on Hospital Compare for public reporting. Dimension top box scores that have been adjusted for survey mode and patient-mix are displayed on Hospital Compare and made available for download, as are the response rates achieved for each individual hospital. Response rates for all hospitals available in public reporting were evaluated for HCAHPS surveys conducted with patients discharged in calendar years 2008 – 2017 to observe overall response rate trends. To understand the relationship between dimension scores and response rates, Pearson correlations were calculated for three quarterly refreshes: April 2018 (July 2016 – June 2017 data), July

2018 (October 2016 – September 2017 data), and October 2018 (January – December 2017 data).⁷ Data were reviewed for all publicly-reported hospitals in the April 2018 and July 2018 datasets. For the October 2018 data refresh, Veterans’ Affairs (VA) hospitals were added to the Hospital Compare dataset but excluded from this analysis.

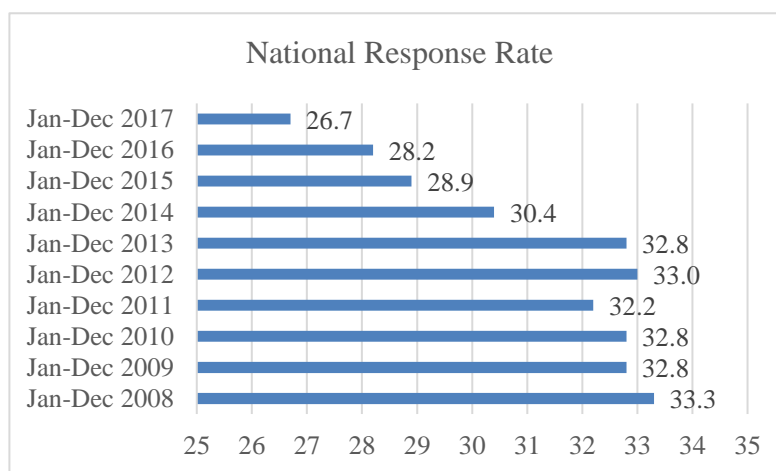
Individual hospital case studies were also examined to understand how the correlation manifests in real-world situations where the data collection methodology changed. Details regarding the data collection changes were provided by the hospitals themselves. Hospital names have been masked to provide anonymity.

Findings

Response rates for the HCAHPS survey started strong when the program was first launched by CMS in October 2006 as a voluntary program and into July 2007, when required participation began. Graph 1 illustrates the trend of the national response rate average for each discrete calendar year of patient surveys starting with the first full calendar year of required participation in 2008. In 2014, the national average for response rate dropped 2.4 points from the previous year, and it has continued a steep decline since. In the refresh for calendar year 2017, the response rate continued to wane, resting at 26.7 percent.

In response to an article published by HQI, *California HCAHPS Improvers Playbook*,¹² the claim of a relationship between the response rate and HCAHPS top-box scores was researched. In the article, HQI observed, “Each 1-percentage-point increase in a hospital’s HCAHPS response rate is expected to result in a 0.5-percentage-point increase in the mean top-box score.”¹² This relationship was replicated by PRC, with similar positive

Graph 1. Annual U.S. National Survey Response Rates



correlations, for data refreshes in April, July, and October 2018. (See Appendix 1 for the table displaying correlations for all three periods.)

As presented in Table 1, the HCAHPS score and response rate correlations show a positive relationship across every HCAHPS dimension. (In general, a value between 0.30 and 0.70 is considered to be a moderate positive relationship, while a value below a 0.30 is considered to be a weak positive relationship.) All correlation values in the analysis of all hospitals fall in the moderate positive correlation category, with the strongest relationships observed for the Responsiveness of Staff and Overall Rating measures.

Typically, if a surveyed sample is representative of the population, a correlation does not exist between response rate and survey results. The moderate correlations observed suggest that, at a national level, the HCAHPS data being collected are not capturing a representative sample of the patient population for these hospitals. Further, one would expect that as the sample becomes more representative of the population—using response rate as a measure of representativeness—the correlation

between response rate and HCAHPS scores should *decrease* as response rate increases. To investigate this, correlations were analyzed for hospitals with a response rate greater than or equal to 40%. As shown in Table 1, correlations between response rate and HCAHPS scores did decrease (weaken) as the response rate increased. (Correlations for previous time periods are included in Appendix 1.)

Case Studies

Research continued by analyzing response rates and HCAHPS performance for hospitals who made a change in their data collection methodology. It was observed that hospitals switching from mail to telephone typically see an increase in response rates, exhibiting more pronounced score changes than what is observed for facilities that have achieved a leveled response rate from using a consistent methodology across several quarters. For this reason, two hospitals new to the telephone methodology and one hospital that previously used telephone, and then switched to mail, were analyzed for performance review. All scores were mode and patient-mix adjusted by CMS prior to public reporting, so changes in survey mode alone should not explain changes in HCAHPS scores.

Table 1. Score correlation with response rate

CMS HCAHPS Dimension	Correlation with Response Rate (RR)			
	All Hospitals		Hospitals w/ RR >=40%	
Responsiveness of Staff	0.517	**	0.236	**
Overall Rating	0.504	**	0.164	**
Nurses Communication	0.496	**	0.132	
Care Transition	0.480	**	0.192	**
Likelihood to Recommend	0.471	**	0.176	**
Doctors Communication	0.424	**	0.062	
Discharge Information	0.414	**	0.164	**
Cleanliness	0.400	**	0.028	
Communication About Medications	0.398	**	0.160	**
Quiet	0.320	**	0.196	**
N of hospitals	4120		290	
**p<0.01				

Data from Hospital Compare, Jan-Dec 2017 discharges

Case study 1

Hospital A began administering the HCAHPS survey via telephone in July 2015. The bottom bar in Graph 2, July 2014 – June 2015, shows the last public reporting period in which all data were collected by mail. In contrast, July 2015 – June 2016 indicates the first period in which all surveys were administered by telephone. Comparing these two mutually-exclusive time periods shows an 8-point increase in response rate. As expected, this improved response rate coincides with an increase in their Overall Rating score, though the score increased more than anticipated.

Based on the correlations discussed in the previous section, Hospital A would expect the 8-point increase in response rate to translate to a 4-point increase in their Overall Rating score between the mail data collection period and the telephone data collection period. In actuality, Hospital A saw a 7-point increase, rising from 61 to 68. For Hospital A, this change demonstrated a statistically significant increase to the Overall Rating score ($z=4.88, p < .001$). Further, comparing the first telephone collection period to the calendar year 2017 results, the telephone methodology has maintained a strong response rate. Over this same period, Hospital A's Overall Rating score has increased two more points; score increases without an associated change in methodology suggest that the efforts of leadership and staff are having the desired, positive impact on how patients perceive their care experience.

Case study 2

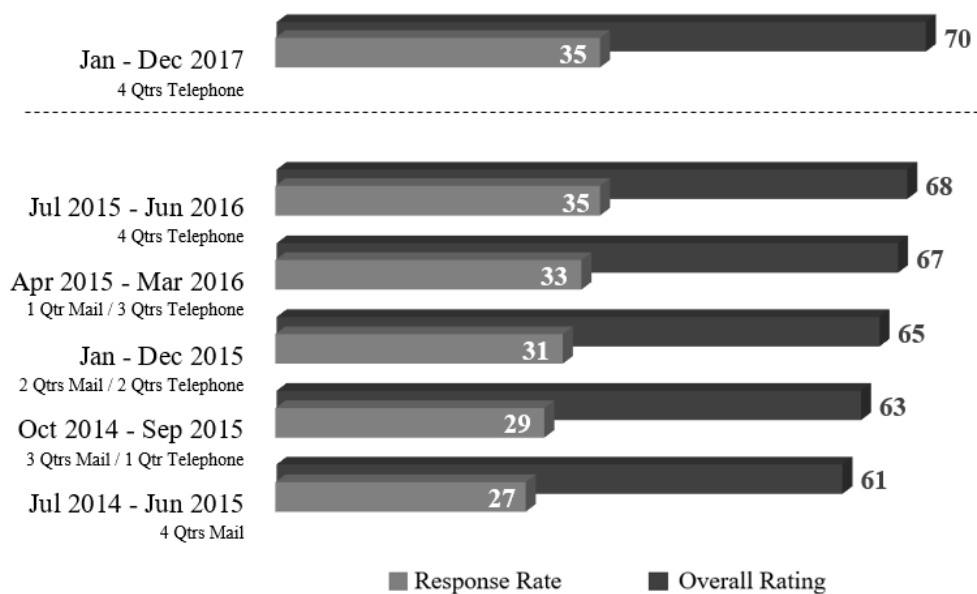
In January 2016, Hospital B changed their data collection methodology from mail to telephone. The bottom bar of Graph 3, showing the period of January – December 2015, was the last reporting period with all four quarters using mail for survey administration, at a response rate of 26 percent and an Overall Rating score of 67. January – December 2016 is the first period with all quarters using telephone for survey administration, where the response rate has improved to 36 percent—a ten-point increase. Based on the correlation analysis, one would expect to see a 5-point increase for their Overall Rating score.

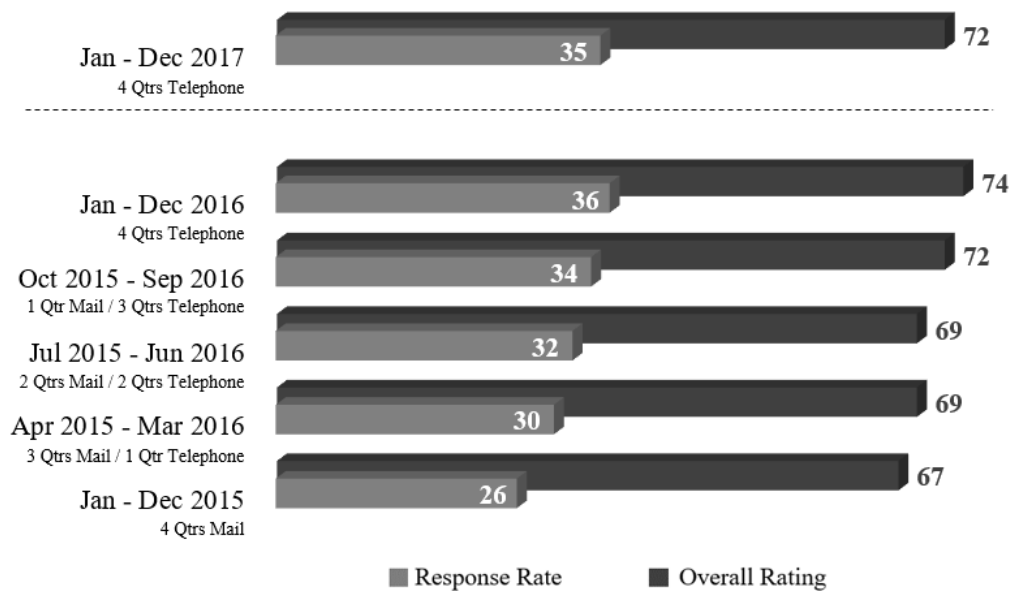
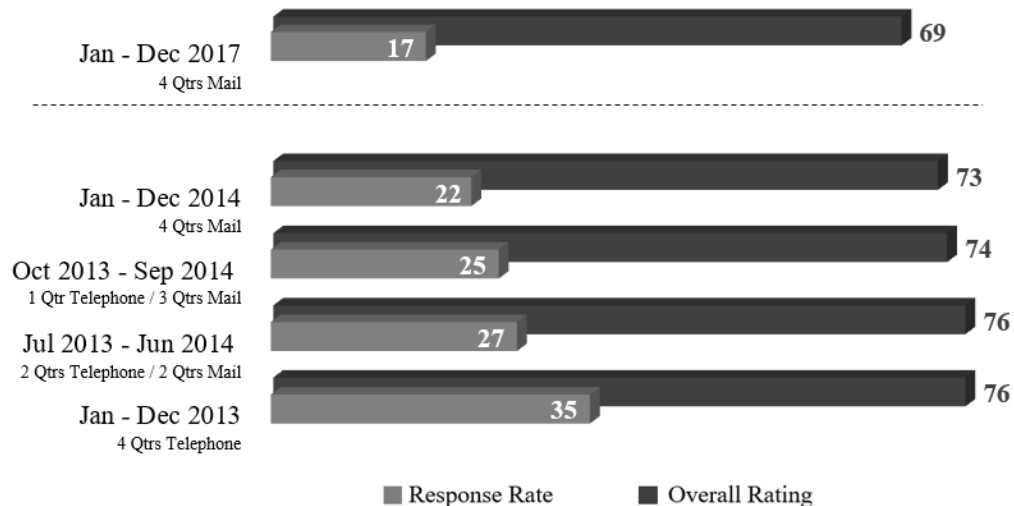
Rather than the expected 5-point increase, Hospital B saw a 7-point gain in Overall Rating, rising to 74 in the January-December 2016 reporting period. For the calendar year 2017 reporting period, the Overall Rating has seen a slight decline, some of which may be attributed to a small decline in response rate.

Case study 3

Analysis found that the relationship between response rate and dimension scores also exists in the opposite direction; if response rate decreases, dimension scores are likely to also decrease. In January 2014, Hospital C switched from telephone to mail survey administration; as shown in Graph 4, both response rate and Overall Rating scores

Graph 2. Hospital A Response Rate and Overall Rating



Graph 3. Hospital B Response Rate and Overall Rating**Graph 4. Hospital C Response Rate and Overall Rating**

Data for April 2013 – March 2014 not available

declined with the methodology change. The January – December 2013 time period is the last four quarters of data collection by telephone. The subsequent time periods show performance using the mail methodology.

With a response rate decrease of 18 points from 2013, the correlation would predict an Overall Rating score of 67 for

the January – December 2017 reporting period. In reality, the Overall Rating for January-December 2017 was 69. The hospital's improvement work during this time likely mitigated the effects of the lower response rate, but comparing score to score, it would appear that those improvement efforts had no discernable impact on patient perceptions of care.

Discussion

When a surveyed sample is truly representative of the total population, a correlation between response rate and dimension scores would be unlikely. Instead, the observed correlations imply that hospitals’ publicly-reported data may not reflect a truly representative sample, perhaps due to a nonresponse error bias in the survey results.¹³ If the response rate and scores are correlated, then it is more likely that nonresponse (low response rate) is contributing to the correlation.¹⁴ As shown in Table 1, when a higher response rate is achieved with the selected sample, and as the survey results become more representative of the population, the correlation between response rate and HCAHPS scores decreases. The correlations between dimension scores and response rate for hospitals with a response rate greater than 40% is much weaker than the correlations noted in the total hospital analysis, supporting the premise that a low response rate reflects data that are *not* representative of the total patient population.

The key to obtaining a more representative sample is *not* administering more surveys, but rather increasing response rate to generate more completed surveys from the sample selected. Administering the survey to 200 selected patients and achieving the 2017 national average response rate of 26.7% means approximately 53 patients completed the survey. With no other changes to the survey administration protocol, one could increase the sample selected to 300 patients and reasonably expect 80 completed surveys. This larger sample of patients who received a telephone call or survey in the mail would certainly yield more survey responses, but simply calling or mailing more patients will not improve the response rate. With increased response rates, hospitals receive valuable feedback from a higher proportion of patients, creating a more representative sample of the total hospital patient population.

Responses from a larger percentage of sampled patients (i.e. higher response rate) ensure that feedback is received from not only patients who fall to the extremes of the perception spectrum but also patients who were generally satisfied with their experience. Therefore, the broader range of patient responses allows for a more balanced and accurate representation of the true perceptions of patients seen at a hospital; this gives leaders and staff greater confidence that the measurement is providing an accurate

evaluation of their improvement efforts. Once the patient non-response bias has been mitigated, one would expect to see the response rate and HCAHPS dimension correlations diminish.¹³

Survey methodology is an important contributing factor to response rate. As part of the 2017 CMS HCAHPS Vendor Update training,⁸ mode experiment results were shared. The mail only mode response rate shows a sharp decline over time, dropping nine points from 2012 to 2016 (Table 2). The telephone methodology was steadier, with a two-point decline from 2012 to 2016. As a result of these findings, CMS updated the mode adjustments applied to HCAHPS scores after this mode experiment, illustrating that mode effects are changing as patient behaviors toward providing feedback evolve.

As long as a moderate correlation exists between response rates and HCAHPS scores, it is recommended that hospitals evaluate their method of data collection to ensure response rate is optimized and survey administration factors are diminished. Maintaining an optimal survey response rate is outlined in the HCAHPS Quality Assurance Guidelines⁶ as a protocol for survey administration, although an optimal response rate is not specified. In line with requirements from the Quality Assurance Guidelines, these findings suggest that there is real value in improving low response rates. Response rate ensures reliability and credibility of the results and permits the research to be generalized to the larger population.¹⁵ In the podcast, *Improving Response Rates of HCAHPS Hospitals*, the HCAHPS Project Team comments, “HCAHPS response rates are important because they affect HCAHPS measure reliability at the hospital level. Measure reliability is better when more patients [within the sample] complete the survey for a hospital.”¹⁰ Research conducted by Saunders, Elliot, Lyrtzopoulos, and Abel,¹⁴ found that while conducting a patient experience survey with cancer survivors, those hospitals with a higher response rate also scored better for the item sets. Analysis by Siddiqui, Wu, Kurbanova, and Qayyum demonstrated that “in the multiple regression models...survey response rate [was] independently associated with higher overall satisfaction.”¹⁶

Conversely, a low response rate can negatively impact a hospital’s HCAHPS scores. Tyser, Abtahi, McFadden, and Presson research the non-response bias in their work

Table 2. CMS Mode Experiment Response Rates

	2006	2012	2016
Mail Only	33%	31%	22%
Telephone Only	27%	34%	32%

Table 3. Published and potential overall rating

Baseline Response Rate	33.31%
Correlation	0.504

Time	Published Overall Rating	Response Rate	Potential Overall Rating with Same Response Rate as 2008	Overall Rating Net Increase
Jan-Dec 2008	64.26	33.31%	64.26	—
Jan-Dec 2009	66.19	32.84%	66.43	0.24
Jan-Dec 2010	67.74	32.79%	68.00	0.26
Jan-Dec 2011	68.72	32.18%	69.29	0.57
Jan-Dec 2012	69.89	32.96%	70.07	0.18
Jan-Dec 2013	70.74	32.16%	71.32	0.58
Jan-Dec 2014	70.99	30.44%	72.44	1.45
Jan-Dec 2015	71.72	28.94%	73.92	2.20
Jan-Dec 2016	72.54	28.20%	75.12	2.58
Jan-Dec 2017	72.99	26.68%	76.33	3.34

where they reference peer-reviewed journals that require a minimum response rate – some as high as 60% – to be published.¹⁷ Implications from these requirements suggest a tipping point, “...when the results of a survey lose any or all validity due to a low response rate.”¹⁷ With a low response rate, it may be difficult to rely on patient experience scores to show that improvements have been effective. The hospital may not be getting enough responses to accurately showcase efforts made by the hospital staff. In addition to the misrepresentation of publicly-reported patient care, morale can decline as staff members question their initiative efforts, when the challenge may actually rest in obtaining a representative sample to evaluate their patient experience delivery accurately.

Opposing research points out that while response rates nationally have decreased over time, the scores for the Overall Rating measure have increased. This statement is, in fact, true; however, these scores could have increased even more. Utilizing the correlation between response rate and Overall Rating, Table 3 shows the published Overall Rating and the potential Overall Rating if the response rate remained steady over time. Using the response rate for the 2008 calendar year and the Overall Rating correlation values calculated for all hospitals from January-December 2017, the potential Overall Rating score could be up to 3.34 points higher than the current average.

Graph 5 visualizes the trend line of both the published Overall Rating score and the potential Overall Rating score if the response rate from 2008 had remained steady over time. Observe that in 2014, the path of the published and potential scores starts to diverge as the response rate

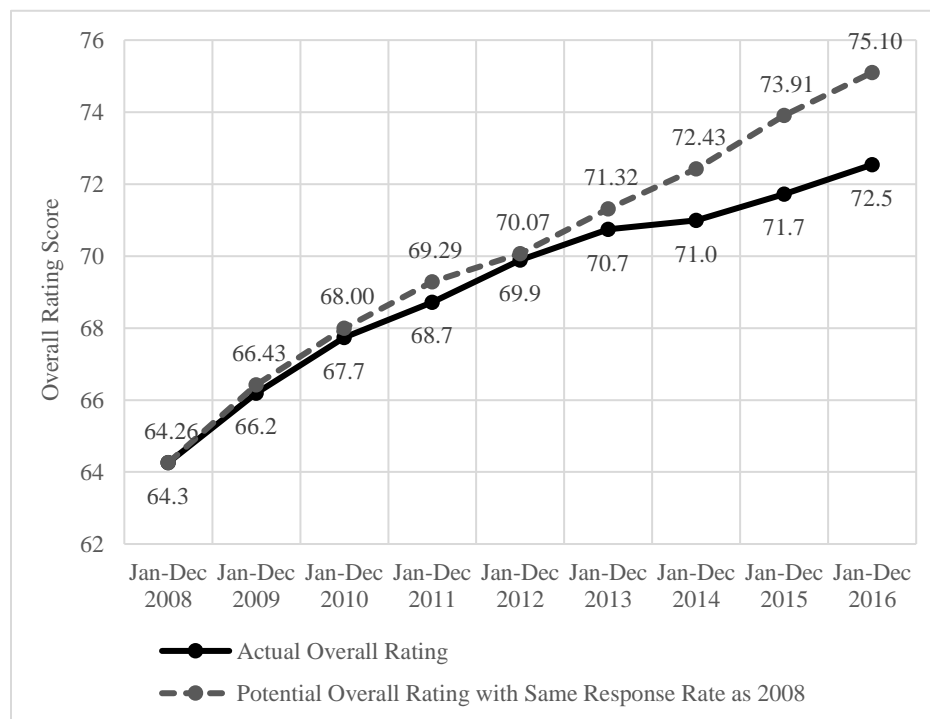
begins to markedly decline (refer to Table 3), suppressing the Overall Rating measure’s potential.

Conclusion

Using publicly-reported CMS HCAHPS national data, the findings recently identified by HQI between response rate and HCAHPS dimension scores for California hospitals were validated for hospitals nationally. A relationship exists between these two variables that weakens (decreases) as the sampled population becomes more representative of the total population. This correlation supports the importance of achieving a high response rate to accurately report a hospital’s true performance score. Hospitals and survey vendors should be aware of this relationship and ensure that their study design choices are yielding an optimal response rate. Siddiqui, Wu, Kurbanova, and Qayyum noted this in their research as well, concluding, “strategies to increase survey HCAHPS response rates should be a priority.”¹⁶

At the September 2018 AHRQ “Advances in Survey Methodology” Meeting, Paul Cleary, a CAHPS Team principal investigator, remarked “that in the face of lower-than-desired response rates, it is important to assess whether the respondents are representative of the population of interest and the extent to which the data may need to be adjusted to compensate for any biases in the sample.”¹¹ If AHRQ and CMS are unable to find a feasible, effective data collection solution that yields accurate, representative survey results, then CMS may consider taking this methodological limitation into account as a component of or variation within its mode adjustment process.

Graph 5. Actual Overall Rating Score vs. Potential Overall Rating Score with Same Response Rate as 2008



While this research analyzed methodology as a primary influencer in the relationship between response rates and dimension scores, it should be acknowledged that there are additional variables external to the care experience that can impact scores. Patient demographics, regional differences, and other survey modes including electronic surveys, mixed mode, and interactive voice response (IVR) lend themselves to further examination. Also, while this analysis identified correlation between response rate and HCAHPS scores, the question of causation remains to be explored.

Additional analysis with quarterly updates is important to evaluate the validity of this relationship going forward. As mentioned, once a population becomes more representative with a higher response rate, the correlations decrease, which implies that changes in scores are reflective of changes in performance and not as affected by response rates.

The analysis presented in this paper is not meant to suggest that the response rate aspect of patient experience measurement is a more effective or meaningful strategy than any of the numerous cultural and tactical initiatives being implemented in hospitals across the country. This analysis highlights one way that hospitals' patient experience measurement may be masking effective improvement efforts because the data are not collected from a representative sample of the population. In The Beryl Institute's Fall 2018 white paper, "The Factors

Influencing Human Experience in Healthcare Today," Dr. Wolf clearly articulates a call to restore a sense of humanity to the interactions that occur throughout the healthcare system: "In the end, it is the things that speak to people as human beings that have the greatest impact."¹⁸ Ultimately, thoughtfully engaging in human-to-human interactions will always prevail as the most important thing caregivers can do to improve patient perceptions of their care experience.

References

1. Wolf JA. Consumer Perspectives on Patient Experience 2018. The Beryl Institute. Accessed March 2019.
2. Wolf JA. The State of Patient Experience 2017: A Return to Purpose. The Beryl Institute: 2017. <http://www.theberylinstitute.org/?page=BXBE> NCHMARKING2017.
3. Deloitte. The value of patient experience Hospitals with better patient-reported experience perform better financially. <https://www2.deloitte.com/us/en/pages/life-sciences-and-health-care/articles/hospitals-patient-experience.html>. Accessed March 2019.
4. Doyle, J., Graves, J., Gruber, J. "Evaluating Measures of Hospital Quality." National Bureau of Economic Research (NBER) Working Paper

- No. 23166. February 2017. JEL NO. I10
<https://www.nber.org/papers/w23166>
5. Bardach, N.S., Asteria-Penaloza, R., Boscardin, W.J., Dudley, R.A., "The relationship between commercial website ratings and traditional hospital performance measures in the USA." *BMJ Quality and Safety*, vol. 22, no. 3, 2013; pp. 194-202.
<https://www.ncbi.nlm.nih.gov/pubmed/23178860>
6. CMS. CAHPS® Hospital Survey Quality Assurance Guidelines V14.
https://www.hcahpsonline.org/globalassets/hcahps/quality-assurance/2018_qag_v13.0.pdf. Accessed March 2019.
7. Hospital Compare. Hospital Compare Datasets 2018. <https://data.medicare.gov/data/hospital-compare>. Accessed April 2018, July 2018, and October 2018.
8. CMS. HCAHPS Update Training.
<https://www.hcahpsonline.org/globalassets/hcahps/training-materials/2017-march-hcahps-update-training-slides-508.pdf>. Accessed March 2017.
9. Tesler R, Sorra J. CAHPS Survey Administration: What We Know and Potential Research Questions. AHRQ.
<https://www.ahrq.gov/sites/default/files/wysiwyg/cahps/about-cahps/research/survey-administration-literature-review.pdf>. Accessed March 2019.
10. HCAHPS Online. Hospital CAHPS Podcast Series – Transcript: Improving Response Rates of HCAHPS Hospitals.
<https://www.hcahpsonline.org/globalassets/hcahps/podcasts/improving-rr-podcast-script.pdf>. Accessed April, 2018.
11. AHRQ. Advances in Survey Methodology: Maximizing Response Rates and the Representativeness of CAHPS® Survey Data.
<https://www.ahrq.gov/sites/default/files/wysiwyg/cahps/surveys-guidance/survey-methods-research/summary-research-meeting.pdf>. Accessed March 2019.
12. Hospital Quality Institute. California HCAHPS Improvers Playbook.
https://www.hqiinstitute.org/sites/main/files/hqi_playbook.pdf. Accessed 2018.
13. Holbrook AL, Krosnick JA, Pfent A. The causes and consequences of response rates in surveys by the news media and government contractor survey research firms. In: *Telephone Survey Methodology*. John Wiley & Sons, Inc; 2008 499-528.
14. Saunders CL, Elliott MN, Lyratzopoulos G, Abel GA. Do differential response rates to patient surveys between organizations lead to unfair performance comparisons?: Evidence from the English cancer patient experience survey. *PMC US National Library of Medicine National Institutes of Health*. 2016 Jan; 54(1):45-54. Doi: 10.1097/MLR.0000000000000457.
15. Center for Innovation in Research and Teaching. Survey Response Rates.
https://cirt.gcu.edu/research/developmentresources/research_ready/designing_surveys/response_rates. Accessed December 2018.
16. Siddiqui ZK, Wu AW, Kurbanova N, Qayyum R. Comparison of Hospital Consumer Assessment of Healthcare Providers and Systems patient satisfaction scores for specialty hospitals and general medical hospitals: confounding effect of survey response rate. *Journal of Hospital Medicine*. 2014 Sep; 9:590-593
17. Tyser AR, Abtahi AM, McFadden M, Presson AP. Evidence of non-response bias in the Press-Ganey patient satisfaction survey. *PMC US National Library of Medicine National Institutes of Health*. 2016 Aug; 16:350. doi: 10.1186/s12913-016-1595-z.
18. Wolf, JA. The Factors Influencing Human Experience in Healthcare Today. The Beryl Institute: 2018. Accessed March 2019.

Appendix 1.

CMS HCAHPS Dimension	Correlation with Response Rate (RR)					
	Jul 2016-Jun 2017 Discharges		Oct 2016-Sep 2017 Discharges		Jan-Dec 2017 Discharges	
	All Hospitals	Hospitals w/ RR >=40%	All Hospitals	Hospitals w/ RR >=40%	All Hospitals	Hospitals w/ RR >=40%
Responsiveness of Staff	0.506 **	.327 **	0.511 **	.303 **	0.517 **	0.236 **
Overall Rating	0.501 **	.293 **	0.499 **	.244 **	0.504 **	0.164 **
Nurses Communication	0.478 **	.265 **	0.489 **	.274 **	0.496 **	0.132
Care Transition	0.438 **	.281 **	0.461 **	.222 **	0.480 **	0.192 **
Likelihood to Recommend	0.459 **	.314 **	0.462 **	.286 **	0.471 **	0.176 **
Doctors Communication	0.410 **	.120	0.408 **	.150 **	0.424 **	0.062
Discharge Information	0.425 **	.216 **	0.426 **	.192 **	0.414 **	0.164 **
Cleanliness	0.389 **	.116	0.384 **	.130	0.400 **	0.028
Communication About Medications	0.378 **	.232 **	0.387 **	.161 **	0.398 **	0.160 **
Quiet	0.310 **	.264 **	0.319 **	.252 **	0.320 **	0.196 **
N of hospitals	4120	300	4126	305	4120	290
**p<0.01						